

<b>Notice of Allowability</b>	Application No.	Applicant(s)
	09/633,330	CAULFIELD, H. JOHN
	Examiner	Art Unit
	Virginia M Kibler	2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1.  This communication is responsive to Amendment After Final filed 6/24/2004.
2.  The allowed claim(s) is/are 5-17 (renumbered 1-13).
3.  The drawings filed on 07 August 2000 are accepted by the Examiner.
4.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a)  All
  - b)  Some\*
  - c)  None
 of the:
  1.  Certified copies of the priority documents have been received.
  2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5.  A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6.  CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a)  including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1)  hereto or 2)  to Paper No./Mail Date \_\_\_\_\_.
  - (b)  including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
7.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

#### Attachment(s)

1.  Notice of References Cited (PTO-892)
2.  Notice of Draftsperson's Patent Drawing Review (PTO-948)
3.  Information Disclosure Statements (PTO-1449 or PTO/SB/08),  
Paper No./Mail Date \_\_\_\_\_
4.  Examiner's Comment Regarding Requirement for Deposit  
of Biological Material
5.  Notice of Informal Patent Application (PTO-152)
6.  Interview Summary (PTO-413),  
Paper No./Mail Date \_\_\_\_\_.
7.  Examiner's Amendment/Comment
8.  Examiner's Statement of Reasons for Allowance
9.  Other \_\_\_\_\_

**EXAMINER'S AMENDMENT**

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

In the claims:

7. (currently amended) Process of classifying unclassified objects using a pattern recognizer as trained and defined in claim 5[[4]], comprising the steps of:  
introducing unclassified objects to the trained pattern recognition system;  
taking data from the unclassified objects;  
retrieving the all of the stored discriminant spaces, decision boundaries and decision rules;  
computing discriminant values from data and plotting discriminant values in the discriminant spaces;  
applying corresponding decision boundaries and decision rules to all the plotted data in parallel, wherein each decision rule classifies objects of a particular class; and combining objects in the same class.

16. (~~allowed previously presented~~) A pattern recognition system comprising:

- (a) a training set of objects each classified in two or more classes;
- (b) means for taking data from each of the objects;
- (c) means for selecting at least one discriminant space and means for computing discriminant values from the data;
- (d) means for plotting the values in the discriminant space;
- (e) a decision boundary associated with the discriminant space;
- (f) a decision rule, defined with respect to the decision boundary, wherein at least one object in the training set is separated and correctly classified by application of the decision rule;
- (g) means for removing correctly classified objects from the training set, thereby creating a remaining set of objects thereby training said pattern recognition system;
- (h) means for storing the at least one discriminant space, corresponding decision boundary and decision rule;
- (i) means for introducing a set of objects known to be members of the two or more classes but unclassified as to which class, to the trained pattern recognition system;
- (j) means for taking data from the unclassified objects;
- (k) means for retrieving the at least one stored discriminant space, decision boundary and decision rule;
- (l) means for computing discriminant values from the data and plotting in the discriminant space;
- (m) means for applying the decision boundary and decision rule to the plotted

values;

(n) means for removing classified objects from the unclassified set; and  
(o) means for sequentially retrieving the next discriminant space, decision boundary and decision rule and applying them to the diminishing unclassified set of objects.

17. (~~allowed previously presented~~) The system defined in claim 16, wherein the decision boundary, that is arranged to separate at least one object and correctly classify that object, is arranged to also maximize the relative distance from the boundary decision to the nearest object of a different class.

#### **REASONS FOR ALLOWANCE**

2. The following is an examiner's statement of reasons for allowance: the instant invention improves the performance of existing pattern recognition systems. In the prior art, a single pattern recognition component is normally trained to perform the entire classification for the entire universe of patterns to be recognized. When analyzing new data, errors are often produced. The essential difference from the prior art is that the instant invention provides a training procedure in which the data discriminants, decision boundaries, decision rules, and the corresponding sequence are all determined and applicable to unclassified new objects. Each decision correctly classifies objects of the same class from the training set, until a last determination has correctly classified the last object of that class. The training procedure is

repeated by presenting an ever shrinking training set to the classifier system for determining error-free classifications. Therefore, the instant invention provides error free classification of all objects in a training set as well as unclassified objects, thereby improving the accuracy of existing pattern recognition systems. These features in combination with the other elements of the claims are not disclosed or suggested by the prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

#### **CONTACT INFORMATION**

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Virginia M Kibler whose telephone number is (703) 306-4072. The examiner can normally be reached on Mon-Thurs 8:00 - 5:30 and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Virginia Kibler can be reached on (703) 308-4072. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*Virginia Kibler*

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09/01/04

**MEHRDAD DASTOURI**  
**PRIMARY EXAMINER**

*Mehrdad Dastouri*